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AN INTEGRAL EVALUATION OF THE FINANCIAL STATE OF THE REGIONAL ENTERPRISES[1]

The subject matter of the article is the development of theoretical positions and methodical approaches to the integral evaluation of the financial state of the region's metallurgical enterprises. The purpose is to show the possibility of dividing the integral evaluation into separate elements for using this tool to build individual models based on the forecasting of the various coordinates of the financial position of enterprise. The hypothesis of the study is based on the objective need to improve the integral evaluation of the financial position of enterprises. This involves the modernization of existing theoretical and methodological approaches to the increase of the quality of analysis by eliminating certain shortcomings of discriminant models in order to clarify the algorithm of constructing the integral index. The methodological bases of systemic approach and mathematical modelling in economics are applied: the methods of financial analysis, grouping, abstraction, comparison which give the possibility of determining the financial indicators needed to build the predictive models of financial state; the methods of correlation and regression analysis, which allow to improve the integral value and to build the mathematical forecasting models. With the purpose of improving the integral evaluation of the financial condition of enterprise, the geometric interpretation is used, which involves the dividing of the integral indicator on the individual elements. The special feature of the proposed methodological approach consists in the implementation rules for the certain procedures of the evaluation of financial position and generalization of the analysis results. The proposed approach can be used by financial analysts to elaborate the strategic plans of company development and structure optimization of financial resources. This research allows to define the quantitative influence of separate parameters on the general assessment of the financial position for the purpose of its forecasting, which is understood as the system of the evidence-based probabilistic assumptions of the basic and alternative structural changes of the enterprise's assets and liabilities.

Keywords: modelling of financial position, integral evaluation of the financial position, financial performance, profitability, paying capacity, liquidity, financial stability, composition and structure of assets and capital, efficiency of enterprise management, forecasting

Introduction

The general assessment of the financial state of an enterprise depends on many indices, which need to be studies in their interrelation. Therefore, there is the necessity to aggregate all the features of an aggregate (financial indices), provided by the fact, that the object of modeling (financial state) demands not only united characteristics, but also bringing into order its separate elements according to the definite traits and principles. The mentioned mechanism is possible to realize with the help of integration assessment, the ground of which rests on the parameters acquired in the result of the analysis of the main variables of the financial state of the subject of national economy (profitability, purchasing ability, liquidity, financial stability, efficiency if the enterprise management) [1]. On the basis of the integrated assessment of the financial state of enterprise, it is possible to comprehensively assess its economic financial performance, to define drawbacks in work and offer the direction of development. Besides, the integrated assessment is the ground of forecasting the financial state of the economic subject, as the adequacy of prognostic data depends on the reliability of the input information.

The metallurgical branch is one of the leading in the industry of the Rostov region, on the territory of which, there are more than 30 large enterprises of ferrous and non-ferrous metallurgy. In the branch, there work more than 30,325 thousand of the employable population of the region, and about 13 % of the main industrial funds are, having a high degree of wear and tear are centered. The perspective

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development of the branch depends on the speed of modernization of equipment a well as on the introduction of innovations and perfection of the methods of financial management.

Thus, the object of the research is a row of metallurgical enterprises of the Rostov region.

Integration index of the financial state of an enterprise

The role of objective assessment of the financial state of an enterprise as the basis of its stable development considerably rises in modern economic conditions. The financial state reflects the efficiency of economic activities of the subject, and its analysis allows simultaneously optimizing the use of financial resources and objectively defining the priority directions of an enterprise, to form strategic plans and control their implementation.

Thus, the objective analysis of the financial analysis provides a construction of the adequate models of prognostication, and the reliable assessment is the basis of an enterprise's development.

The comparative analysis of the traditional methodologies [2–4] has revealed the certain advantages as well as the disadvantages of different methodological approaches, which, in their turn, complicate their use for prognostication of the financial state of an enterprise. That is why we have improved (from the procedure point of view) the methodology of the analysis of the financial state of the economic subject, which ultimately consists of interrelated blocks (fig. 1).

The first block is the study of the structural changes in the assets and capital of an enterprise that is conducting a vertical and horizontal analysis of the indices of the aggregated balance, their assessment in dynamics.

The second block is the analysis of financial stability on the basis of relative indices, such as the ratios of independence, the correlation of domestic and borrowed resources, the maneuvering of domestic means, securing return assets by domestic capital, the concentration of the borrowed capital and returning of the debt.

The third block is based on the analysis of liquidity and solvency: the general index of liquidity, the ratio of absolute liquidity, the intermediate ratio of coverage, the current ratio of coverage and ratio of the current liquidity.

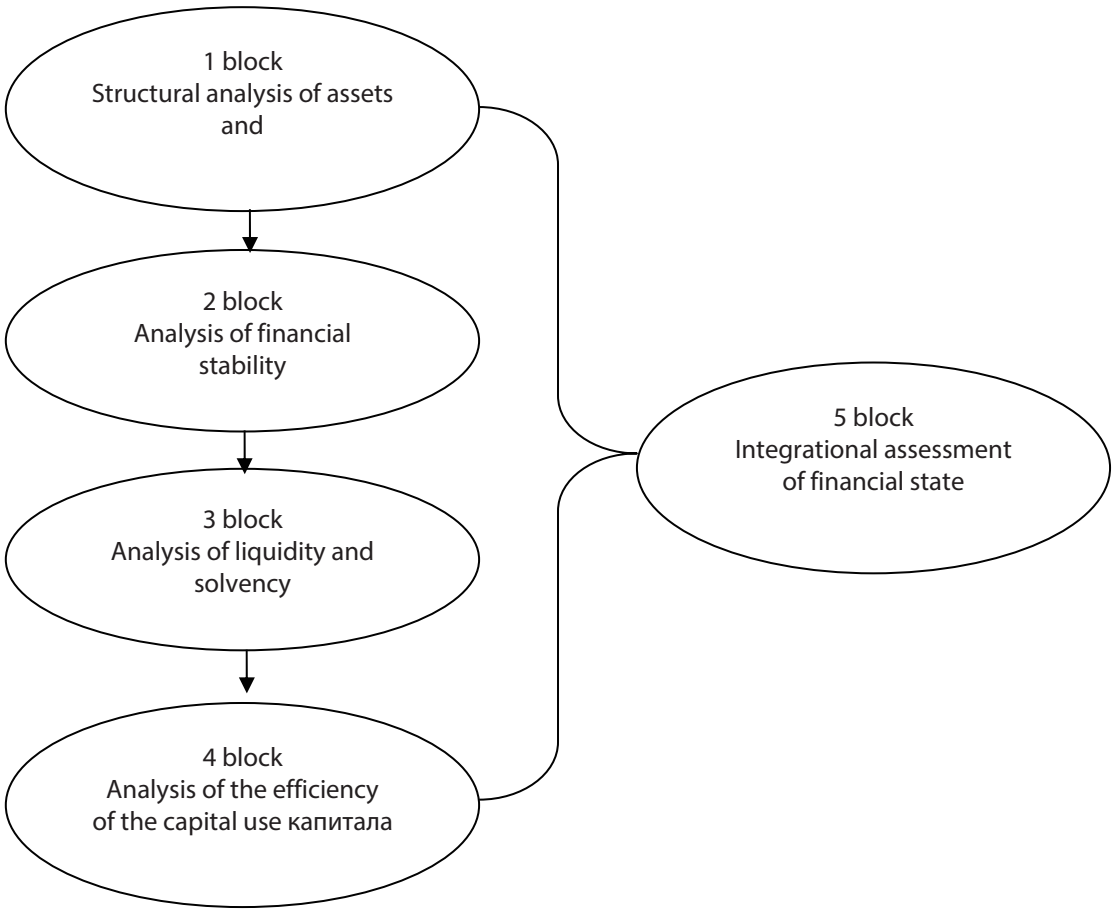

Fig. 1. *Structural and logical scheme of the analysis of the financial state of the enterprise for the aim of prognosis*

The forth block includes the study of relative indices of the efficiency of the capital use: the indices of the product profitability, investments, circulating assets and capital.

The fifth block is generalizing, it supposes the definition of integral index of the financial state. The basis is the uniting of a row of basic indices, characterizing the variables of the financial states.

The peculiarity of the suggested approach is in the succession of conducting the procedures of the assessment of the financial state and mechanism of generalizing of the analysis results.

Thus, the elaborated methodology as the first stage provides the arrangement of the assessment of the content of the assets and liabilities of an enterprise, their structural elements (working and non-working assets, own and borrowed capital). Together with this, the assessment supposes the vertical and horizontal analysis of balance and its main sections. The expedience of this step is provided by the fact that the quality of assets and liabilities exerts immediate influence on the basic subsystems of the financial state, in particular on the primary data of industrial and managerial calculation.

The analysis of the financial state of an enterprise according to the developed methodology is the first stage of defining the perspectives of its changes. The necessity of the analysis is provided by the fact that its results are the informational basis for defining the prognostic financial state of an enterprise.

The main aim of the mentioned analysis is the investigation of the possibility of using various financial indices for the prognosis of financial state. To achieve the formulated aim, we can group the metallurgical enterprises of the Rostov region (with the help of methods of strategic analysis) according to the level of separate indices and study the dynamics of the change of specific gravity of separate groups of the economic subjects. This grouping allowed to calculate the dimensions of changes and dynamics of the frequency of their variations, and also to define the stability of changes and make conclusions relatively to the expediency of their inclusion to the latest models of prognosis of the financial state. The analysis of the researched metallurgical enterprises enables us to make the following conclusion: for the prognosis of the financial state, it is advisable to use the indices, characterizing the vertical structure of the assets and liabilities of an enterprise and also the efficiency of the capital use.

On the whole, the suggested approach may become the ground of prognosis of the financial state of the given system of indices most fully reflect all the financial aspects of functioning of the economic subject and their dynamics, gives the possibility to show the common tendencies, which in perspective will influence the results of the organization performance.

The economic context of the integration assessment is in uniting the separate financial indices according to the definite procedure and principles into a general quantitative index. The use of this approach allows to define the generalizing assessments of economic subjects, compare them from the point of view of the efficiency of financing and prognostic activities. It is necessary to mention that the integral assessment is also an effective mechanism of comparing the financial and economic activities of separate enterprises [5]

The universalism and complex of the integrated index allow to use it in prognostic financial activities of an enterprise, that is, the prognostic financial state will be defined by the level of the prognosticated integration index.

The foreign economists with the aim of financial prognostic activities propose to use different methods: rational [6]; of experts' evaluation [7], etc.

In Russian scientific practice, much attention to the research of integration index of the financial state is given in the works of O. O. Tereshenko [8]. The mentioned models are built on the basis of the methods of discrimination analysis and empirical data of the enterprises of different types of performance [9–11].

A high level of objectivism and grounding of discrimination models allows to make a conclusion of the expediency of their use for prognostication of the financial state of the Russian enterprises. It means that the given models is possible to put into the grounding of the development of the models of prognostication of financial activities [12]. That is why they are used for the initial calculations.

The object of the research is the row of metallurgical enterprises of the Rostov region. For calculations we use the model:

$$Z = 0,674X_1 + 1,633X_2 + 0,488X_3 + 0,223X_4 + 1,138X_5 + 0,55X_6 + 0,528X_{10} - 2,752, \quad (1)$$

where X_1 — the current assets/current circumstances; X_2 — own capital/the sum of the balance; X_3 — the net profit from realization/the sum of the balance; X_4 — the clean money flow from the operational activities/net income from realization + other operational income; X_5 — the movement of money means from operational and investment activities/currency of the balance; X_6 — the net profit from realization/net borrowed capital; X_{10} — net income from realization/average leftovers of the working assets.

On the basis of discrimination models, an integration index (Z) was calculated, the quality of the financial state of metallurgical enterprises and their reference to the definite class were defined[2] (Table 1).

Table 1

Integration and rating assessment of the researched metallurgical enterprises of the Rostov region*

Enterprise	2011		2012		2013		2014		2015	
	Meaning (Z)	Class	Meaning (Z)	Class	Meaning (Z)	Class	Meaning (Z)	Class	Meaning (Z)	Class
OOO "METKOM"	16,61	A	249,27	A	-20,24	Д	28,74	A	14,37	A
OOO "Aloid"	3,18	A	4,07	A	5,29	A	3,45	A	5,93	A
OOO "Trubstalkomplect"	1,74	A	2,67	A	4,73	A	7,98	A	5,26	A
OOO "ST"	-0,10	Б	1,18	Б	3,64	A	4,18	A	4,01	A
OOO "Yugmetallstroy"	2,33	A	2,26	A	3,40	A	4,09	A	3,99	A
OOO "Grand" Resurce»	1,81	A	2,80	A	0,46	Б	2,99	A	2,60	A
ZAO "Derkul"	3,21	A	9,75	A	39,07	A	5,72	A	2,46	A
OOO "Atlantis"	3,86	A	4,42	A	7,91	A	4,51	A	2,04	A
OOO "TransMet"	0,31	B	-0,01	B	0,02	Б	0,34	Б	0,13	B
OOO "ASTM-Standart"	2,85	A	4,50	A	-121,25	Д	-2,12	Г	0,00	Б
OOO "CVmetall"	-1,35	Г	-1,46	Г	-1,13	B	-2,92	Д	-3,34	Д
OOO "Sevazh"	-2,13	Г	-2,21	Д	-2,16	Г	-4,85	Д	-6,39	Д
OOO "Alta"	-4,44	Д	-11,14	Д	6,99	A	-31,6	Д	-8,84	Д
OOO "OptMetall-Servis"	20,08	A	-298,2	Д	-940,80	Д	-30,1	Д	-8,86	Д
OOO "Metallotorg"	42,74	A	-10,73	Д	-2,78	Д	-3,60	Д	-78,88	Д

* Calculated by the authors.

On the basis of the ranging of the points of integration assessment, a group of enterprises-leaders is singed out, whose meaning of the integration assessment were included in the zone of the stable financial state by the end of 2015 and during the investigated period had a relative stable assessment. These enterprises are OOO "Metkom", OOO "Aloid", OOO "Trubstalkomplekt", OOO "Yugmetallstroy", OOO. "Grand Resurs", OOO. "Derkul", OOO. "Atlantis". To the second group, we can refer enterprises, which financial state was unstable, the meaning of integrational index fluctuated, with that they were in the zone of indefiniteness with both positive and negative dynamics: OOO "TransMet", OOO "ASTM-Standart", OOO "SVmetall", OOO "Sevazh", OOO. "Alta", OOO "Opt-Service", OOO "Metalotorg".

The results of the carried out integration assessment testify the possibility of the use of the given approach for the forecasting of the financial state, because in the majority of the research enterprises, the results of the analysis received with the help of integration assessment and separate financial indices do not contradict to each other. In spite of the definite advantages, the seen algorithm of integration assessment of the financial state of the economic subjects has some disadvantages:

1) ignoring of the additive value of the integration assessment from the viewpoint of some variables of the financial state of an enterprise that is the impossibility of defining the influence of the liquidity

[2] Ob utverzhdenii "Metodicheskikh ukazaniy po provedeniyu analiza finansovogo sostoyaniya organizatsiy". Prikaz FSFO RF ot 23 yanvarya 2001 g. № 16 ["On the enforcity "Methological directions on conducting financial state of organizations". Deurec of FSFO on Junuary 23 2001 №16]. Available at the naalitical- legal system "Konsultant Plus".

level, financial instability and efficiency of using capital on the assessment of financial performance. The liquidation of the given gap will help to investigate the financial state on separate directions, single out the factors, which negatively influence the general level of the integration index and also to develop actions for their elimination;

2) the limitation of the use by the negative meaning of the net borrowed capital as unsatisfactory, which is connected with the negative meaning of the ratio of circulation of the borrowed capital, which further will belittle the meaning of the integration index;

3) a high level of generalization and low degree of working out in detail of the general assessment of the financial state;

4) the existence of the zone on indefiniteness with a large scope of the change of the meaning of the integration index, which makes the assessment of the financial state more complex. That is by receiving the meaning of the integration index, which is in the zone of indefiniteness, the analyst has to make a more detailed analysis of the financial performance of an enterprise.

To eliminate the mentioned problems is advisable on the basis of the geometrical interpretation of the integral assessment of the financial state. The given approach analyses the integration assessment as a point in multidimensional space that is the integral assessment is point X with coordinates (x_1; x_2; x_3; ...; x_m). Proceeding from the theory of the additive value, it is possible to assert that the integration assessment of the financial state is formed on the basis of the financial stability, liquidity and solvency, efficiency of the capital use [9; 13].

As the indices, characterizing the financial state, have different influence, to construct an integration index, it is recommended to use the formula of average arithmetic weighted that is when each index has a definite level of significance:

$$I = \sum_{1}^{m} s_i \omega_i, \tag{2}$$

where m — the quantity of the financial indices of the integration assessment; s_i — the standardized meaning of financial index; ω_i — the weight (significance) of financial ratio.

Thus, the construction of the integration index of the financial state of economy, according to the suggested approached, foresees the following stages: 1) formation of a certain multitude, in the given case, it is the choosing of indices (factors), characterizing the financial state of an enterprise; 2) the grounding of the significance of financial ratios and defining their influence on the level of the integration assessment; 3) defining the procedure of standardization of the indices.

The economic sense of the integration assessment is a complex investigation of the financial state of an enterprise, characterized by a number of different indices, the analysis of each separately does not allow to assess the general financial situation. In connection with this, it is rather vital to use the aggregated index.

The improvement of the integration assessment of the financial state of the metallurgical enterprises of the Rostov region

On the basis of the offered approach and defined earlier integration index, it is suggested to improve the existing mechanism of the integration assessment of the financial state of the economic subject.

The selection of financial indices must become the major moment of building an integration index. On the basis of the analysis done by the authors as the input data, it is advisable to take the system of financial ratios, characterizing different aspects of the financial state of an enterprise: profitability of the investments of net profit (Z_1); profitability of the current assets (Z_2); profitability of the constant capital (Z_3); profitability of investments (of capital) (Z_4) profitability of their own capital (Z_5); profitability of the assets of money flows (Z_6); the general profitability of production (Z_7); profitability of realization (Z_8); profitability of realization on the net profit (Z_9); profitability of realization on money flows (Z_{10}); circulations of the working means (Z_{11}); circulation of material assets (Z_{12}); circulation of one's own capital (Z_{13});circulation of the credit debt (Z_{14}); circulation of the debit debt (Z_{15}); absolute liquidity (Y_1); general liquidity (Y_2); coverage of the obligations of the debit debt (Y_3); the current liquidity (Y_4); the providing with own working means (X_1); correlation of own and borrowed means (X_2); financial independence (X_3); long-term attraction of the borrowed means (X_4); maneuvering of one' own means (X_5); concentration of the borrowed capital (X_6); coverage of the debt by a money flow (X_7).

The resulting index of the assessment of the financial state is its integration meaning (I).

The given factors reflect different aspects of the financial state of the economic subject, together with this taking them separately, it is possible to assess financial variable, in general, the others are treated as additional characteristics. Besides, in the result of the analysis of separate financial ratios, the certain contradictions and non-attachments emerge are making the defining of adequate and concrete assessment of the financial state of an enterprise more complex.

Taking this into account, the strength of the connection and mutual provision between separate ratios allowing to avoid the inadequate influence of the given indices on the complex conclusions relating to the financial state of the economic subject. The strength between separate indices and their influence on the integration assessment of the financial state, it is advisable to investigate with the help of the methods of correlation analysis. Foreseeing the calculating of the ratios of chosen and pair correlation. The maximum meaning of the ration of correlation testifies the strength between the financial indices [10; 14].

Parameters characterizing the financial state of an enterprise have some dependence. This is the prerequisite for the hypothesis of the existing of multicollinearity, the essence of which is in a high mutual dependence between financial indices, which negatively influence on the objectivity of the complex assessment of the financial activities, as a small change of any of them may exert a substantial influence on the meaning of the integration assessment.

The given fact maintains the necessity of finding the indices, which are closely connected between each other, as ignoring this may negatively impact on the adequacy of the prognosticated models.

The indices with a large degree of correlation (more than 0, 8) should be excluded from the research. Meanwhile, the decision which index to leave and which to eliminate will depend on the influence of the meaning of the ratio of correlation with a dependent index of integration assessment [11; 15].

Parameters, closely correlating between each other, may be excluded with the help of the definition of an indicator of pair correlation. This approach foresees the building of correlation matrix in which both selected and pair ratios are reflected (Table 2).

Based on the calculation, the indices are singled out, inadequately influencing the integration assessment of the financial state of an enterprise due to the effect of multicollinearity, for removal of the negative influence, which is to be eliminated: $Z_1, Z_3, Z_4, Z_5, Z_6, Z_{11}, Z_{13}, Z_{14}, Y_2, Y_3, X_1, X_2, X_6$.

The excluding of the given indices will allow increase the objective influence of some of them on the integration index of the financial state of an enterprise due to the elimination of multicollinearity.

The next stage of the improvement of the integration assessment is defining the influence of each of the financial indices, which left after elimination. The necessity of the mentioned is provided by the fact that separate financial parameters differently influence on the general assessment of the activities.

For the definition of the level of the influence of each parameter on the integration assessment of the financial state of an enterprise we use the meaning of the ratio of correlation:

$$|t_i| = \frac{|r_i|\sqrt{n-2}}{\sqrt{1-r_i^2}} > t_{1-\alpha;n-2}, \quad (3)$$

where $t_{1-\alpha;\,n-2}$ is the table meaning of t-criterion of Student, defined on the level α, with $n-2$ degrees of freedom and the determiner t-distribution of Student:

$$t_i = \frac{r_i\sqrt{n-2}}{\sqrt{1-r_i^2}}, \quad (4)$$

where r_i is the meaning of the ratio of correlation; n is the number of observations (with $n-2$ degrees of freedom and degree of meaning $\alpha = 0{,}4$).

The choice of the given parameters of t-distribution is maintained by the level of their adequacy, their building of financial models. The degree of influence of financial determiners defines the necessity of their inclusion into integral assessment (Table 3).

The analysis of the material of table 3 allows to emphasize the factors, not substantially influencing on the integration assessment of the financial state, in particular, these are ratios Z7, Z9, Z10, X4, X5, X5. Consequently, these parameters is advisable to exclude from the system, defining the integration assessment.

Thus, the integration assessment of the financial state of the metallurgical enterprises must include the following parameters:

Table 2

Correlation matrix of the financial parameters of the integration assessment of the metallurgical enterprises*

	I	Z_1	Z_2	Z_3	Z_4	Z_5	Z_6	Z_7	Z_8	Z_9	Z_{10}	Z_{11}	Z_{12}	Z_{13}	Z_{14}	Z_{15}	Y_1	Y_2	Y_3	Y_4	X_1	X_2	X_3	X_4	X_5	X_6	X_7
I	1,0000																									
Z_1	–0,1393	1,00																								
Z_2	–0,2043	0,87	1,00																							
Z_3	0,0045	0,05	–0,01	1,00																						
Z_4	–0,1665	0,99	0,89	0,04	1,00																					
Z_5	0,0001	0,15	0,08	0,96	0,13	1,00																				
Z_6	–0,0053	–0,01	0,01	0,00	–0,01	0,01	1,00																			
Z_7	–0,0076	0,02	0,03	0,01	0,03	0,01	0,00	1,00																		
Z_8	–0,1768	0,51	0,73	–0,25	0,57	–0,18	–0,06	0,17	1,00																	
Z_9	–0,0076	0,02	0,03	0,01	0,03	0,01	0,00	1,00	0,17	1,00																
Z_{10}	–0,0155	0,08	0,12	–0,01	0,09	0,00	0,83	0,34	0,11	0,34	1,00															
Z_{11}	–0,1749	0,08	0,16	–0,23	0,11	–0,14	–0,15	0,24	0,23	0,24	–0,05	1,00														
Z_{12}	–0,1270	–0,05	0,15	–0,14	–0,02	–0,10	0,05	0,30	0,20	0,30	0,12	0,44	1,00													
Z_{13}	–0,0078	0,04	0,05	–0,91	0,05	–0,95	–0,05	0,00	0,22	0,00	–0,01	0,14	0,09	1,00												
Z_{14}	–0,3197	0,38	0,55	–0,11	0,44	–0,09	–0,13	0,14	0,69	0,14	0,02	0,44	0,27	0,13	1,00											
Z_{15}	–0,3068	0,06	0,06	–0,20	0,09	–0,09	–0,06	0,15	0,15	0,15	–0,02	0,85	0,15	0,07	0,38	1,00										
Y_1	–0,3698	0,34	0,44	–0,04	0,39	–0,02	0,08	0,06	0,57	0,06	0,15	0,20	0,08	0,04	0,69	0,35	1,00									
Y_2	–0,2622	0,41	0,59	–0,06	0,47	–0,05	0,06	0,12	0,73	0,12	0,16	0,11	0,27	0,09	0,85	0,13	0,80	1,00								
Y_3	–0,1266	0,25	0,43	–0,07	0,29	–0,06	0,05	0,14	0,57	0,14	0,09	0,03	0,37	0,08	0,62	–0,03	0,57	0,85	1,00							
Y_4	–0,1653	0,40	0,58	–0,07	0,46	–0,05	0,07	0,15	0,72	0,15	0,18	0,09	0,25	0,10	0,79	0,06	0,69	0,96	0,88	1,00						
X_1	–0,0702	0,30	0,63	–0,01	0,33	0,00	0,02	0,40	0,65	0,40	0,24	0,14	0,48	0,04	0,53	–0,09	0,29	0,60	0,57	0,63	1,00					
X_2	–0,0103	0,05	0,06	–0,93	0,06	–0,96	–0,03	0,00	0,23	0,00	0,01	0,13	0,07	1,00	0,13	0,08	0,05	0,09	0,08	0,10	0,03	1,00				
X_3	–0,1125	0,38	0,64	–0,06	0,41	–0,04	0,00	0,46	0,75	0,46	0,24	0,25	0,46	0,10	0,63	0,01	0,39	0,67	0,63	0,69	0,93	0,09	1,00			
X_4	0,0052	0,06	0,17	–0,26	0,06	–0,02	–0,03	0,04	0,24	0,04	0,01	0,33	0,22	0,01	0,07	0,35	0,01	0,03	0,05	0,04	0,14	0,02	0,13	1,00		
X_5	0,0138	–0,06	–0,09	0,92	–0,08	0,95	0,05	0,00	–0,25	0,00	0,00	–0,13	–0,08	–1,00	–0,15	–0,07	–0,06	–0,12	–0,09	–0,12	–0,08	–1,00	–0,12	–0,02	1,00	
X_6	0,1091	–0,38	–0,64	0,06	–0,41	0,04	0,00	–0,46	–0,75	–0,46	–0,24	–0,25	–0,46	–0,10	–0,63	–0,01	–0,38	–0,67	–0,63	–0,69	–0,93	–0,09	–1,00	–0,13	0,12	1,00
X_7	–0,0193	0,05	0,07	–0,01	0,07	0,00	0,92	0,01	0,05	0,01	0,77	–0,10	0,03	–0,02	0,00	0,00	0,24	0,18	0,13	0,17	0,06	0,00	0,05	–0,01	0,02	–0,05

0,80 – correlation indices

* Calculated by the authors.

1) the profitability of the realized production and the current assets;
2) the circulation of the material assets and debit debts;
3) absolute, current liquidity and financial independence.

The interrelation of the integration index with separate indicators, characterizing financial activities, reflects the ratio of correlation allowing the definition of the level and direction of the parameters, influencing the parameters of the integration assessment of the financial state.

Table 3

Calculating and table meaning of *t*-distribution of Stuart for the optional aggregation of the researched enterprises

Parameter assessment	r_i	t_i	$t_{1-\alpha;\,n-2}$	The level of influence on the integration
Z_2	–0,20	1,783296	0,85	substantial
Z_7	–0,01	0,065159	0,85	unsubstantial
Z_8	–0,18	1,534401	0,85	substantial
Z_9	–0,01	0,064849	0,85	unsubstantial
Z_{10}	–0,02	0,132333	0,85	unsubstantial
Z_{12}	–0,13	1,09404	0,85	substantial
Z_{15}	–0,31	2,753947	0,85	substantial
Y_1	–0,37	3,401118	0,85	substantial
Y_4	–0,17	1,431922	0,85	substantial
X_3	–0,11	0,967139	0,85	substantial
X_4	0,01	0,044345	0,85	unsubstantial
X_5	0,01	0,118051	0,85	unsubstantial
X_7	–0,02	0,164526	0,85	unsubstantial

The definition of the meaning of each parameter is advisable to do on the basis of the diapason of the change of the factual level of the choice ratio of correlation, reflecting the strength of connection between the integration assessment and corresponding parameters. The choice of the interval of change was based on the following principles:

1) if the parameter does not influence the financial state, then its weight is null;
2) the largest significance of the parameter was calculated from the logics of the building of the integration assessment, when the total sum must not be more than 100, and as the chosen number of indices is 7, correspondently, the maximum influence is 14 (100/7);
3) for more accurate reflection of the strength it is suggested using the lag of change of meaning on the level 1 (Table 4).

Table 4

The definition of the financial parameters on the basis of the correlation ratio*

Absolute interval of the change of correlation parameter	The significance of weight (weightiness) of the financial parameter on the integration assessment
0,005–0,031	1
0,032–0,058	2
0,059–0,085	3
0,086–0,112	4
0,113–0,139	5
0,140–0,166	6
0,167–0,193	7
0,194–0,220	8
0,221–0,247	9
0,248–0,274	10
0,275–0,301	11

* Calculated by the authors.

As it has been defined, the financial state of an enterprise is characterized by the parameters of financial stability, liquidity, solvency and efficiency of the capital use, and the integration assessment is the aggregates characteristics of their standardized meanings.

The standardized meanings of financial parameters must reflect the optimal formation and distribution of financial resources for the investigated enterprises.

In this connection, the given procedure is offered to conduct by the division of factual parameters on the average meaning of corresponding financial parameters of those enterprises, the dynamics of which has the tendency to improvement.

That is the standard meaning is offered to be calculated in the following way:

$$s_i = \frac{x_i}{a_i}, \tag{5}$$

where x_i is a factual meaning of the financial parameter; a_i is the average meaning of the financial parameter of the investigated enterprises.

Thus, the integration parameter of the financial state (2), due to the definite mechanisms of standardization (5), will be calculated in the following way:

$$I = \sum_{1}^{m} \frac{x_i}{a_i} \omega_i, \tag{6}$$

where x_i is a factual meaning of the financial parameter; a_i is the average meaning of the financial index; ω_i is the weight (significance) of the financial ratio.

Conducting all these stages of building the integration assessment let the authors emphasize the system of financial parameters, define their standardized meaning and influence (through significance) on the aggregated assessments of the financial state (Table 5).

The analysis of the received results allows to make a conclusion that the level of absolute liquidity influence a lot on the level of the integration index in particular and the assessment of the aggregated financial state.

The received model allows to define what namely are the variables of the integration assessment of the financial state — efficiency of the capital use, solvency and liquidity and financial stability — have a tendency to deteriorate and simultaneously develop an action of prevention of the negative dynamics.

Table 5

The parameters and their significance in the integration assessment of an enterprise*

A parameter	Weight ω_i	Standard meaning of a_i
Efficiency of the capital use, Z		
Profitability of the current assets	8	0,175
Profitability of realized production	7	0,128
The ratio of circulation of material assets	5	12,836
The ratio of circulation of debit solvency	12	7,617
Ratio of absolute liquidity, Y		
Ratio of absolute liquidity	14	0,189
Ratio of current liquidity	7	1,648
Financial stability, X		
Ratio of financial independence	4	0,639

* Calculated by the authors.

The advantage of the given model is the distinct identification of a variable, negatively influencing on the aggregated assessment of the financial state of an enterprise.

Detailed elaboration of the types of the financial state of an enterprise

The issue of the expediency of referring an enterprise to a certain class, that is acquiring depending on the meaning of an integration index of a definite meaning of the letter (A, B,C, etc.) is still significant. In our opinion, such methodical approach is limited, as it supposes the aggregated assessment of the financial state on the basis of the meaning of the integration index and does not take into consideration the dynamics of the change of its variables. This may bring to an inadequate conclusion relatively

Table 6

Integration index of the financial state of the researched metallurgical enterprises of the Rostov region*

Enterprise/years	2011				2012				2013				2014				2015	
	Z	*Y*	*X*	*I*	*Z*	*Y*	*X*	*I*	*Z*	*Y*	*X*	*I*	*Z*	*Y*	*X*	*I*	*Z*	*Y*
OOO "METKOM"	26,38	7,10	3,99	37,47	25,19	8,68	4,22	38,09	31,25	11,57	4,19	47,01	21,63	7,22	4,00	32,84	20,73	5,25
OOO "Aloid"	6,56	3,94	2,91	13,41	–75,57	3,77	1,42	–70,38	20,92	6,34	1,90	29,16	13,40	6,24	1,63	21,28	24,76	6,76
OOO "Trubstalkomplekt"	27,69	2,85	2,98	33,52	16,02	3,45	2,87	22,35	18,84	3,88	2,63	25,34	27,16	4,88	3,57	35,61	32,43	5,55
OOO "ST"	3,39	1,44	–1,34	3,49	3,42	1,02	–2,06	2,37	35,87	1,50	–1,79	35,58	56,27	1,85	–1,24	56,88	23,82	3,50
OOO "Yugmetallstroy"	11,26	21,39	1,95	34,59	12,22	6,80	1,34	20,36	4,23	7,05	1,07	12,36	10,85	8,61	2,06	21,53	13,18	7,93
OOO "Grand Resurs"	3,82	3,25	1,51	8,58	9,21	5,95	1,69	16,85	4,11	3,05	0,29	7,45	7,79	6,36	2,09	16,25	17,39	4,08
ZAO "Derkul"	20,35	5,40	3,25	28,99	28,47	22,07	3,28	53,81	30,50	29,91	3,51	63,92	22,93	12,08	3,23	38,25	18,47	14,26
OOO "Atlantis"	14,07	2,42	2,25	18,73	28,57	2,77	1,90	33,24	46,56	4,10	1,89	52,55	39,99	6,60	1,78	48,37	30,81	5,45
OOO "TransMet"	8,85	3,73	1,11	13,69	9,16	3,66	0,70	13,52	–9,03	2,98	–0,03	–6,09	8,73	3,49	–0,18	12,04	10,29	3,50
OOO "ASTM-Standar"	12,16	5,37	1,95	19,47	26,98	8,49	2,52	37,99	29,52	8,94	2,93	41,39	18,38	11,27	4,17	33,82	17,05	15,28
OOO "CVmetall"	22,93	0,91	–1,90	21,95	–17,33	0,74	–2,14	–18,73	–8,33	0,56	–3,06	–10,84	–5,19	0,87	–5,69	–10,00	–24,85	0,62
OOO "Sevazh"	–49,43	1,04	–4,03	–52,42	–59,10	0,84	–6,04	–64,30	–25,02	1,47	–7,53	–31,07	–35,26	0,58	–13,92	–48,60	–10,74	0,59
OOO "Alta"	15,10	9,55	4,88	29,53	25,69	10,92	4,63	41,24	34,85	15,92	3,53	54,30	37,31	56,06	4,21	97,58	31,43	54,86
OOO "Optmetall-Service"	46,20	33,70	4,90	84,79	73,21	67,04	5,13	145,38	74,74	54,79	5,15	134,67	67,30	58,91	5,44	131,65	58,90	92,91
OOO "Metallotorg"	35,57	9,53	5,05	50,15	54,61	21,75	5,38	81,74	67,89	71,46	5,43	144,77	49,44	67,52	5,41	122,37	31,77	22,75

* Calculated by the authors.

Zone of the effective use of capita	*12-th Type* *Z>0 X<0 Y>20*	*Profitable enterprises with high level of liquidity, but the lack of inner sources of financing; brings to the losing of financial independence*	*The zone of optimal liquidity and solvency*	*15-th type* *Z>0 0<X<3 Y>20*	*Profitable enterprises with unsatisfactory financial stability, which to a large extend is provided by the amount of the borrowed capital*	*18-th type* *Z>0 X>3 Y>20*	*Successful enterprises with a high level of efficiency of capital use, optimal structure of financing the current activities and high level of liquidity and solvency.*
	11-th Type *Z>0 X<0 10<Y<20*	*The enterprises which efficiently use capital, but the disproportion in the structure of assets and/or capital brings to the financial independence*	*The zone of insufficient level of liquidity and solvency*	*14-th type* *Z>0 0<X<3 10<Y<20*	*Profitable enterprises, depending on the external sources of financing, with a low level of liquidity and solvency*	*17-th type* *Z>0 X>3 10<Y<20*	*Enterprises effectively using capital and having sufficient level of financial stability, but without paying enough attention to the level of solvency and liquidity of the level of solvency an enterprise.*
	10-th Type *Z>0 X<0 Y<10*	*Profitable enterprises, having the possibility to get credits, but this brings to the emergence of the dependence on the external sources of financing. Together with this the level of solvency of the mentioned enterprises is under the limit of the recommended level*	*Zone of unsatisfactory level liquidity and solvency*	*13-th type* *Z>0 0<X<3 Y<10*	*Enterprises with sufficient level of efficiency of capital use and the lack of solvency and financial stability*	*16-th type* *Z>0 X>3 Y<10*	*Stability of financial state is provided by the efficiency of the capital use and its optimal structure, together with this one can observe the lack of the most liquidity means for maintaining the efficient level of liquidity.*
	Zone of negative financial stability			*Zone of unsatisfactory financial stability*		*Zone of stable financial state*	
Zone of ineffective capital use	*1-st type* *Z<0 X<0 Y<10*	*Financial state may be characterized as close to bankruptcy. This type is characterized by the loss of activities, low circulation of assets and lack of own means of financing the current performance of an enterprise*	*Zone of unsatisfactory level liquidity and solvency*	*4-th type* *Z<0 0<X<3 Y<10*	*This type of a low level of liquidity and financial stability, provided by inefficient capital use of an industrial enterprise*	*7-th type* *Z<0 X>3 Y<10*	*Enterprises with small effect, but which by their own and leveled to them sources are able to provide the financial stability.*
	2-nd type *Z<0 X<0 10<Y<20*	*Stability of this type depends on external sources of financing. This type is characterized by low efficiency of capital use, liquidity and solvency*	*Zone of insufficient level liquidity and solvency*	*5-th type* *Z<0 0<X<3 10<Y<20*	*Loss of the activities and a considerable size of the current circumstances, which brings to the loss of financial stability and solvency of an enterprise*	*8-th type* *Z<0 X>3 10<Y<20*	*The given type is characterized by insufficient level of solvency and loss, but sufficient volume of its own resources helps to provide a high level of financial stability.*
	3-th type *Z<0 X<0 Y>20*	*Enterprises, which efficiently use capital, but at the expense of synchronization of debit and credit debts they manage to reach a high level of solvency by non-optimal structure of financing*	*Zone of optimal level liquidity and solvency*	*6-th type* *Z<0 0<X<3 Y>20*	*An enterprise which level of liquidity is on the normative level, but inefficient use of capital leads to the loss of financial independence*	*9-th type* *Z<0 X>3 Y>20*	*Enterprises with a low level of income due to balance of their own and borrowed the capital are able to achieve financial stability, liquidity and solvency.*

Fig. 2. *Matrix of the financial state types of an enterprise*

to the reasons of the financial state of an enterprise. That is why the authors suggest the detailed elaboration of the types of the financial states of an enterprise by the analysis of the main variables of the integration assessment. To define the type of the financial state is advisable to use the calculated meaning of variable of the integration assessments *Z*, *X*, *Y* (Table 6).

The grouping of the enterprises according to the levels of the indices, characterizing the separate elements of the financial state allowed the definition of the types of the financial state, defined by the quality and level of the efficiency of the capital use, financial stability, liquidity and solvency.

Coming out of the possible scope of changes and standard meanings financial parameters by the schemes the following types of the financial state of an enterprise are defined (Fig. 2).

The suggested approach foresees referring an enterprise to a certain group depending on the meaning of integral parameters, characterizing the financial stability, efficiency, capital use, liquidity and solvency. The advantage of this approach is the defining financial state on the basis of its variables, characterizing the separate aspects of financial state, i.e. such an approach has a large degree of detailed elaboration, positively influencing on the adequacy and reliability of the general conclusion on the financial economic subject.

In the case of necessity of the conclusion on the financial state of an enterprise, it is possible to use the meaning of integration index — I, allowing to objectively make a complex assessment of the financial state, as it is a consolidating mechanism of financial indicators.

On the basis of definite types of financial state and the level of their integration assessment, the types of financial state of an economic subject, describing its characteristic, is defined (Table 7).

Table 7

Classification of types of financial state depending on the meaning of integration index*

The meaning integration index	Financial state	General characteristics of financial state
Less than 0	Unsatisfactory	Characterized by unprofitable activities, dependence on external sources of financing and the lack of own working means
0–30	Unstable	Low level of the efficiency of the capital use, characteristic unstable capital structure and low level of liquidity
31–61	Satisfactory	Middle-level profitability and working assess by the insufficient level of solvency or financial stability
61 и более	Stable	Judicators, characterizing financial state on the optimal level

* Compited by the authors.

It is necessary to mention that the choice of detail elaboration of the linguistic definition of the type or kind of the financial state depends on aims of analysis and prognostication.

It is advisable to give the assessment both on the basis of separate variables of the financial state and integration index, as these linguistic characteristics supplement each other.

Thus, the integration index of financial state is calculated state by stage:

1. Calculation of financial indices; characterizing the financial state of an enterprise (the list of indicators is in Table 5).

2. Defining according to the formula (5) standardized indices of the financial state.

3. Definition of coordinates of financial state of an enterprise by the formula:

$$Z = \sum_{1}^{m} \frac{z_i}{a_i} \omega_i, \tag{7}$$

$$Y = \sum_{1}^{m} \frac{y_i}{a_i} \omega_i, \tag{8}$$

$$X = \sum_{1}^{m} \frac{x_i}{a_i} \omega_i, \tag{9}$$

where *Z*, *Y*, *X* are coordinates of the financial state, characterizing the dynamics of the change of its separate variables; z_i, y_i, x_i, are factual meaning of corresponding financial indicators; ω_i weight (meaning) of financial ratio; a_i is an average meaning of a financial indicators; *m* is the quantities of financial indicators of the integration assessment.

The weight and standard meaning of the meaning defined in Table 5.

4. Finding the integration index of financial state according to the formula:

$$I = Z + Y + X. \quad (10)$$

5. Comparing of the received digital indicators with linguistic types of the financial state due to coordinates (See Fig. 2, Table 7).

6. Generalization of the conclusion of the financial state of an enterprise on the basis of integration indicator.

Using the conclusion on the financial state, the building of analytical table. The mentioned calculations were done for all the investigated enterprises, but the volume of the article does not allow to give conclusions and calculations of all economic subjects, that is why on example of the calculations for OOO "Trubstalkomplekt" on the basis of which the developed proposals were implemented into practical resources (Table 8).

Table 8

Integration indicator of the financial state of OOO "Trubstalckomlekt" *

Indicator	ω_i	a_i	2011		2012		2013		2014		2015	
			$z\,y\,x$	s_i	$z\,y\,x$	s_i	$z\,y\,x$	s_i	$z\,y\,x$	s_i	$z\,y\,x$	s_i
The efficiency of the capital use, Z												
Profitability of the current asserts	8	0,175	0,231	10,55	0,021	0,97	0,043	1,96	0,191	8,73	0,208	9,49
Profitability of the realized production	7	0,128	0,142	7,77	0,075	4,08	0,069	3,76	0,131	7,16	0,159	8,71
Ratio of material asserts circulation	5	12,836	8,670	3,38	9,395	3,66	11,220	4,37	8,533	3,32	7,358	2,87
Ratio of circulation of debit debt	12	7,617	3,806	6,00	4,637	7,31	5,556	8,75	5,047	7,95	7,212	11,36
Z			27,69		16,02		18,84		27,16		32,43	
Solvency and liquidity, Y												
Ratio of absolute liquidity	14	0,189	0,001	0,101	0,001	0,065	0,001	0,087	0,002	0,145	0,001	0,093
Ratio of current liquidity	7	1,648	0,647	2,747	0,798	3,390	0,892	3,789	1,114	4,733	1,286	5,460
Y			2,85		3,45		3,88		4,88		5,55	
Financial stability, X												
Ratio of financial independence	4	0,639	0,477	2,984	0,459	2,871	0,420	2,631	0,571	3,575	0,556	3,479
X			2,98		2,87		2,63		3,57		3,48	
Integration index			33,52		22,35		25,34		35,61		41,47	
General characteristic of financial state			satisfactory		unstable		unstable		satisfactory		satisfactory	

* Calculated by the authors.

On the basis of the calculations and proposed matrix of the types of financial state of OOO "Turbstalkomlekt", the general tendencies of changes were defined, and the factors negatively influencing on the financial state of society were identified. The analysis of the received data gives the possibility to confirm that the main reason for negative dynamics of the change of integration index in 2011—2013 was a reduction of the level of the efficiency of capital use provided by decreasing of profitability of production realization. Besides, the insufficient level of liquidity and financial stability was observed, as well as the improvement of solvency of an enterprise. In 2014–2015, OOO "Trubstalkomplek" at the expense of raising the efficiency of capital use, managed to improve the financial stability and make it closer to the level of the recommended meaning.

It is necessary to point out that during the period of research, there was a scarcity of liquidity means at the enterprise, which led to an insufficient level of solvency, which negatively influenced the general assessment of the financial state of the enterprise. Thus, for the further improvement of the

financial state, OOO "Trubstalkomplek" should implement the policy, directed to optimization of the correlation of assets and obligations.

Summing the conducted research it is possible to assert that the integration assessment of an enterprise is the basis of forecasting of the financial state of the enterprise, as it consists of the basic indicators reflecting it comprehensively.

The possibility of dividing the integration assessment into variables financial stability, liquidity, solving and the efficient use of capital will allow to reveal the factors essentially influencing on the financial state of an enterprise and to prognosticate its activities in a dynamic perspective. In general, the generality and adequacy of the proposed approach to the integration assessment let to put it as the ground of forecasting the financial state of an enterprise.

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